**Table S1**

*Model Fit Indices and Model Comparisons for Cross-Lagged Panel Model between Nature Contact and Problem Behavior*

|  |  |  |  |
| --- | --- | --- | --- |
| **Models** | **Model Fit Indices** |  | **Model Comparisons (vs. Model 1)**  |
| *χ*2 | *df* | CFI | TLI | SRMR | RMSEA |  | Δ*χ*2 | Δ*df* | ΔCFI | ΔTLI | ΔSRMR | ΔRMSEA |
| Model 1 | 24.95 | 17 | .952 | .941 | .033 | .052 |  | - | - | - | - | - | - |
| Model 2 | 28.78 | 19 | .956 | .933 | .037 | .054 |  | 3.83 | 2 | 0.004 | -0.008 | 0.004 | 0.002 |
| Model 3 | 36.58 | 19 | .958 | .945 | .043 | .056 |  | 11.63 | 2 | 0.006 | 0.004 | 0.010 | 0.004 |
| Model 4 | 36.49 | 17 | .965 | .944 | .043 | .051 |  | 11.54 | 0 | 0.013 | 0.003 | 0.010 | -0.001 |

*Note*. Model 1, cross-lagged panel model with freely estimated paths; Model 2, cross-lagged panel model with constrained auto-regressive paths; Model 3, cross-lagged panel model with constrained cross-lagged paths; Model 4, cross-lagged panel model with constrained auto-regressive and cross-lagged paths. Abbreviations: *χ*2= Chi-square test, *df* = degrees of freedom, CFI = comparative fit index, TLI = Tucker-Lewis index, SRMR = standardized root mean square residual, RMSEA = root mean square error of approximation.

**Table S2**

*Standardized Parameter Estimation for the Cross-Lagged Panel Model for Nature Contact and Problem Behavior*

|  |  |  |  |
| --- | --- | --- | --- |
| **Paths** | **T1 → T2** |  | **T2 → T3** |
| *β* | *SE* | *p* |  | *β* | *SE* | *p* |
| **Auto-regressive paths** |  |  |  |  |  |  |  |
| Nature contact | .48 | .03 | < .001 |  | .45 | .03 | < .001 |
| Problem behavior | .40 | .03 | < .001 |  | .42 | .03 | < .001 |
| **Cross-lagged paths** |  |  |  |  |  |  |  |
| Nature contact **→** problem behavior | -.14 | .03 | < .001 |  | -.14 | .03 | < .001 |
| Problem behavior **→** nature contact | -.12 | .03 | < .001 |  | -.13 | .03 | < .001 |

*Note.* The *β* represents the standardized regression coefficients. Abbreviations: T1 = Time 1; T2 = Time 2; T3 = Time 3.

**Table S3**

*Model Fit Indices for Cross-Lagged Mediation Panel Models*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Models** | ***χ*2** | ***df*** | **CFI** | **TLI** | **SRMR** | **RMSEA** |
| Model 5 | 96.37 | 35 | .937 | .902 | .076 | .063 |
| Model 6 | 113.532 | 35 | .789 | .868 | .098 | .087 |
| Model 7 | 77.12 | 54 | .953 | .921 | .061 | .056 |

*Note*. Model 5, prosocial behavior unidirectionally mediates the relationship between nature contact and problem behavior; Model 6, prosocial behavior unidirectionally mediates the relationship between problem behavior and nature contact;

Model 7, prosocial behavior bidirectionally mediates the relationship between nature contact and problem behavior. Abbreviations: *χ*2 = Chi-square test; *df* = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation.

**Table S4**

*Standardized Parameter Estimation for the Cross-Lagged Mediation Panel Model*

|  |  |  |  |
| --- | --- | --- | --- |
| **Paths** | **T1 → T2** |  | **T2 → T3** |
| *β* | *SE* | *p* |  | *β* | *SE* | *p* |
| **Auto-regressive paths** |  |  |  |  |  |  |  |
| Nature contact | .44 | .04 | < .001 |  | .42 | 0.04 | < .001 |
| Prosocial behavior | .26  | .05 | < .001 |  | .29 | 0.05 | < .001 |
| Problem behavior | .37 | .04 | < .001 |  | .40 | 0.04 | < .001 |
| **Cross-lagged paths** |  |  |  |  |  |  |  |
| Nature contact **→** prosocial behavior | .21 | .04 | < .001 |  | .21 | 0.04 | < .001 |
| Prosocial behavior **→** problem behavior | - .11 | .04 | .006 |  | - .12 | 0.04 | .006 |
| Problem behavior **→** prosocial behavior | - .06 | .03 | .035 |  | - .07 | 0.04 | .033 |
| Prosocial behavior **→** nature contact | .12  | .04 | .001 |  | .13  | 0.04 | .001 |

*Note.* The *β* represents the standardized regression coefficients. Abbreviations: T1 = Time 1; T2 = Time 2; T3 = Time 3.

**知情同意书**

**Informed Consent Form**

**尊敬的家长** **Dear Parent/Guardian：**

您好！我们是北京林业大学心理系的研究团队，正在进行一项关于儿童自然接触和儿童行为方面的研究。为了保证研究的顺利进行，并保障您和您孩子的权益，我们特此向您说明本研究的相关内容，并请求您的同意。

We are a research team from the Department of Psychology, Beijing Forestry

University (BJFU). We are conducting a study natural contact and children’s behaviors. To ensure the smooth progress of the research and to protect the rights of you and your child, we provide the following information and seek your consent.

**研究目的** **Purpose of the Study:**

通过这项研究，我们希望了解儿童自然接触与儿童行为之间的关系，为家长和教育工作者为促进儿童与自然的接触和行为发展提供新的思路和方法。

This study aimed to understand the relationship between children’s exposure to nature and their behavior, providing new insights and methods for parents and educators to facilitate children’s interaction with nature and behavioral development.

**研究内容** **Study Content:**

我们将通过一份问卷来了解您孩子的一些情况，包括他们与自然的互动、他们的合作行为，以及他们可能存在的一些挑战性行为。整个调查需要约 40 分钟。

The study will involve a questionnaire, including your child’s interaction with nature, their cooperative behavior, and some challenging behaviors they may exhibit. The survey is expected to take approximately 40 minutes to complete.

**隐私保护** **Privacy Protection:**

我们非常重视您和您孩子的隐私。本次调查的数据将严格保密，所有信息 仅用于本研究目的。研究结果将以匿名的方式进行报告，不会透露任何个人信息。

We take your and your child’s privacy very seriously. All data collected will be kept strictly confidential and will only be used for research purposes. The results will be reported in an anonymous form, ensuring that no personal information will be disclosed.

**参与权益** **Voluntary Participation:**

您的参与是完全自愿的，您有权随时退出调查，而不会对您和您孩子产生任何不利影响。完成调查后，您的孩子将会获得一份礼物。

Your participation is entirely voluntary, and you may withdraw from the survey at any time without any negative consequences for you or your child. After

completing the survey, your child will receive a gift as compensation for participation.

**联系方式** **Contact Information:**

如您有任何问题或需要进一步了解本研究，欢迎随时与我们联系 yx0903yingzhong@163.com.

如果您同意您和您的孩子参与本次研究，请签署以下知情同意书。

If you have any questions or would like more information about this study,

please feel free to contact us. If you agree to participate in this study with your child,

please sign the consent form below.

**家长签名** **Parent/Guardian Signature：**      

**日期** **Date ： 2022/7/2**

我们非常感谢您的支持与合作！

Thank you very much for your support and cooperation!